

PSYCHOMETRIC ANALYSIS OF NOISE POLLUTION ON TRAFFIC WARDENS IN THE DISTRICT OF SOUTH KARACHI

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Abstract

Objective: To analyze psychological changes such as stress, anxiety and depression in exposed and non-exposed traffic police Place and duration of the study: The experimental study was designed at Al-Tibri Medical College and Hospital, during Jan 2023 to Mar 2023 Material and Methods: Total 150 traffic wardens of different sites of Karachi south, Sindh Pakistan recruited in the survey. Survey was conducted through personal interviews and based on becky henry depression inventory scale online google form. Data was statistically analyzed by SPSS and Chi-square was performed to analyze the relationship between the professional environment and mental health. Results: The study reports the findings of an investigation into the physical and mental health of traffic wardens. The mean age of the recruited wardens was 38.72 ± 12.19 years, and the average exposure time throughout their service was 6.24 ± 5.39 years. The mean noise level during sampling was recorded at 77.17 ± 9.89 decibels. The study found high levels of depression (58%), anxiety (64.7%), and stress (70.7%) among the participants. There was a statistically significant association between depression and exposure to noise (p-value 0.001), while anxiety and stress did not show any significant association (p-value 0.036 and 0.166, respectively). Conclusion: The study highlights the alarming levels of depression, anxiety, and stress among traffic wardens. The findings indicate a significant association between depression and exposure to noise, which could have serious implications for the physical and mental well-being of traffic wardens.

Keywords: Depression, Professional Hazard, Mental Health.

INTRODUCTION

Sound is defined as vibrations that travel through air or another medium that can be heard when they reach a person's or animal's ears. WHO defines Noise as an unwanted sound. Traffic noise is increasing day by day, and is considered to be an environmental health problem. (G Bluhm¹, 2004). Environmental risk factors for numerous diseases include traffic noise. (AndreasSeidler, 2017). Decreased quality of sleep is a major health outcome of environmental noise.[1]. Environmental noise exposure is known to cause irritation, mental stress reactions, sympathetic and endocrine stress reactions (raised stress hormone levels), and psychological illnesses like depression and anxiety, all of which worsen cerebrocardiovascular function.[2] "Stress is defined as a state of threatened homeostasis." The glucocorticoids, arginine vasopressin, corticotropin-releasing hormone, and the catecholamine's norepinephrine and epinephrine are the main effectors of the stress system. Activation of the stress system causes adaptive behavioral and physiological changes.[3] The integrated communication of numerous physiological systems that control cellular growth and development is substantially facilitated by hormones[4]. A large body of epidemiological and experimental studies demonstrated that exposure to traffic noise is associated with increased risk of cerebrocardiovascular disease such as stroke, arterial hypertension, ischemic heart disease, and myocardial infarction.[2]. Furthermore, traffic noise exposure is also associated with mental health symptoms and psychological disorders such as depression and anxiety, which further increase maladaptive coping mechanisms (e.g., alcohol and tobacco use).[2]

According to a World Health Organization (WHO) report, diseases (such as ischemic heart disease, children's cognitive impairment, sleep disturbance, tinnitus, and annoyance) associated with traffic noise cause at least one million disability adjusted life years (DALY) to be lost each year in Western Europe (WHO, 2010).[5]. Many studies suggests that road traffic noise exposure may be responsible for many psychological symptoms. In 2008, a meta-analysis revealed seven studies that used objective noise exposure with various categories and confounding control as inclusion criteria and looked at the relationship between road traffic noise and myocardial infarction (MI).[6]

In case-control and cohort studies, there appeared to be a greater risk for MI at exposures to noise levels above 60 dB, albeit being statistically insignificant for all exposure groups, in contrast to cross-sectional studies, which reported no influence of noise.[6]. Meta-analyses of noise annoyance in relation to depression, anxiety, and general mental health. In the meta-analyses, we found that depression was approximately 1.23 times greater in those who were highly noise-annoyed (N = 8 studies). We found an approximately 55% higher risk of anxiety (N = 6) in highly noise-annoyed people. "[7]. It is noteworthy that even brief exposure to nocturnal aero plane noise has been linked to takotsubo cardiomyopathy, a disorder brought on by emotional stress and excessive release of the stress hormone cortisol (also known as broken-heart syndrome)[2].

Babisch developed the modern noise reaction model, which includes a "indirect pathway" based on the disruption of sleep, communication, and activity that is primarily caused by low level noise exposure (even by sound pressure levels of 50-60 dB(A)), changing emotional and cognitive parameters, and causing annoyance, followed by the negative health effects mentioned above.[8]

One study was conducted which showed that the nocturnal excretion of catecholamine's in urine was studied in 30–45-year-old women whose bedroom and/or living room were facing streets of varying traffic volume. The traffic volume of the streets was used as an indicator of noise exposure; adrenaline and noradrenaline concentrations were assessed as indicators of the outcome of the physiological stress.[9].

As mentioned above, many studies show that noise has an impact on health. Transportation is increasing day by day which creates noise and air pollution, both of which have significant impact on police wardens. The purpose of this study is to determine the levels of depression, anxiety, and stress hormones among noise-exposed and non-noise-exposed police officers.

METHODOLOGY

The study conducted was a Case Control study design, which aimed to evaluate the psychological changes induced by noise exposure on traffic wardens in the Karachi South district. The study was conducted between February 2022 and September 2022 in the District Karachi South in Pakistan. The sample size selected for the study was 150 individuals. The sampling technique used in the study was a questionnaire approach. The inclusion criteria for the study were exposed and non-exposed traffic wardens in Karachi South district, while the exclusion criteria were traffic wardens from other districts of Karachi and those with underlying comorbidities such as hypertension and diabetes. The methodology used in the study involved recording sound frequency at different destinations in District Karachi South with the help of a decibel meter. The frequency kept as a threshold was above 90 dB. The sound frequencies recorded were Zainab Market (92.4 dB), Il Chundrigarh Road (90.5 dB), Teen Talwar (95.8 dB), Cantt Station (90.1 dB), Shakrahe Faisal (91.2 dB), and Rex Centre (90.7 dB). The study aimed to appreciate psychological changes induced by noise exposure, and to achieve this, the researchers conducted interviews using a questionnaire based on depression anxiety and stress scale (DAASS) which is a pre-defined scale for the psychometric analyses along with the other demographic factors.

RESULTS

In this study it was observed the mean age of the traffic warden recruited in this study was about 38.72 12.19 years, the mean Noise level at the time of Sampling was noted at 77.17 9.89 db and the total exposure time of the traffic warden throughout the total serving was calculated about 6.24 5.39 years (Table 1)

Table 1: Mean Age, Noise level and exposure time

	Mean	Std. Deviation
AGE (Yrs)	38.720	12.1986
NOSIE LEVEL (db)	77.177	9.8947
EXPOSURE TIME (Yrs)	6.2458	5.39512

Depression Anxiety Stress Scale showed the higher frequency of the extremely servers Depression, Anxiety and stress in traffic warden that was 58%, 64.7% and 70.7% respectively. (Figure 1)

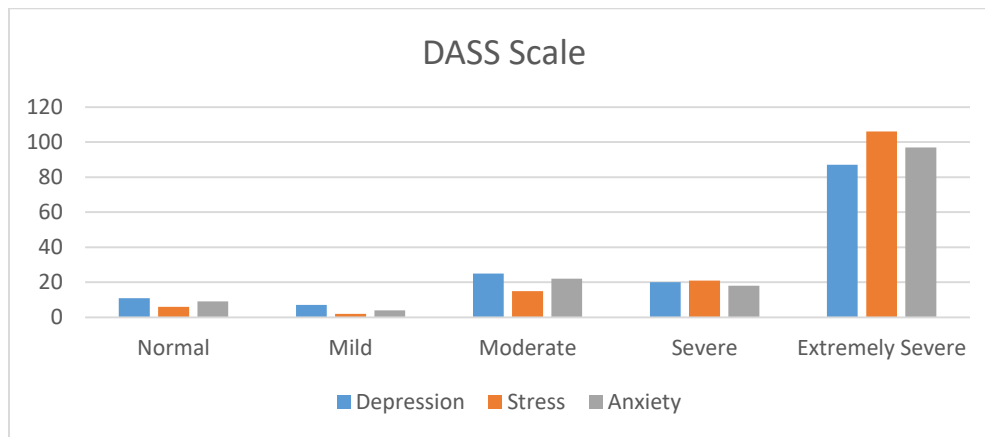


Figure 1: DASS Scale Scoring,

Association analysis of Depression onset with the exposure to the noise was found to be statistically highly significant at p-value 0.001, while other two conditions i.e anxiety and stress came out statistical non-significant at p value 0.036 and 0.166 (Table 2)

Table 2: Association of mental condition with the exposure of noise

		GROUPS		Pearson Chi-Square	df	p-Value
		Control	Exposed			
Depression	Normal	9	2	21.650	4	0.000
	Mild	2	5			
	Moderate	21	4			
	Severe	9	11			
	Extremely Severe	34	53			
Stress	Normal	4	2	4.639	4	0.326
	Mild	2	0			
	Moderate	9	6			
	Severe	12	9			
	Extremely Severe	48	58			
Anxiety	Normal	6	3	6.480	4	0.166
	Mild	2	2			
	Moderate	12	10			
	Severe	13	5			
	Extremely Severe	42	55			

DISCUSSION

In our study, we utilized the DASS Scale (depression anxiety stress scale) to measure the occurrence of depression, anxiety, and stress among traffic wardens. Our findings revealed that the prevalence of depression, anxiety, and stress among traffic wardens was 58%, 64.7%, and 70.7%, respectively. We also conducted an association analysis between depression onset and exposure to noise, which yielded a statistically significant result with a p-value of 0.001. However, we found no significant association between anxiety and stress with a p-value of 0.036 and 0.166, respectively. Our study also included several variables such as age, duty hours, service times, total exposure time, and ethnicity. Our results indicated that the mean age of the traffic wardens included in our study was approximately 38.72 ± 12.19 years, the mean noise level during sampling was 77.17 ± 9.89 db, and the total exposure time throughout their service was approximately 6.24 ± 5.39 years.

According to the study conducted in Iran, sound pressure levels were assessed in 75 different locations across four heavily trafficked roadways in Ahvaz city during daylight hours, using sound level meters TES-1353. The results revealed that the sound pressure levels were equivalent to 76.28db, and the most significant negative health effects of noise were related to nervousness and poor sleep quality, which occurred during the year 2012. The sound measurements were found to be higher than both the US Environmental Protection Agency (EPA) and Iran standard levels[10].

Unlikely the results of this study, in one study classified the participants into four groups based on their exposure time, namely A (1-5 years), B (5-10 years), C (10-15 years), and D (15-20 years). The statistical analysis revealed that the p-values for stress and aggravated depression were found to be statistically non-significant at 0.093 and 0.033, respectively[11].

When participants were questioned, it was discovered that 30% of them admitted to experiencing work-related stress, while 23% reported experiencing symptoms of depression. Additionally, 24% of participants reported experiencing outbursts of anger. Other psychological issues that were mentioned included irritability, difficulty concentrating, feelings of inferiority, nervousness, and loneliness. The study participants were constables aged between 31-40 years [12]. The sleep disturbance was observed in about 90% of the traffic constable who were continuously exposed to the noise[13] this refers that they may be having mental health issue which could be due to the exposure to the traffic noise.

Another study also reported the hearing loss, sleep disturbance, palpitation, and headache in majority of the subjects which were exposed to the noise level more than 80db[14] this study supports the results of current study that noise level is associated with the mental health and may cause the psychological issues.

In 2005 a study suggested the developing of depression due to the traffic noise cause by the air crafts[15]. Noise-sleep interaction was found to be statistically significant in

Norwegian population[16] which couples the results of this study. That Noise level directly disturbs the neural physiology and can cause mental health issues. Since the quality of sleep is directly linked with the mental wellbeing of the person.

According to the study conducted in 2018 reported that, hospitals too have high noise where patients were admitted[17]. Similarly street vendors who have exposure to the noise pollution were found to be stressed[18]. A study which seconded the result of this study, reported that subjects exposed to road traffic noise in Taichung were found to be statistically associated with the development of depression[19].

CONCLUSION

This study highlights the potential negative impact of noise exposure on the mental health of traffic wardens. The results indicate that a significant proportion of traffic wardens experience depression, anxiety, and stress, with depression showing a strong association with noise exposure. These findings underscore the need for measures to reduce noise exposure and promote mental wellbeing among traffic wardens. Such measures could include providing ear protection, promoting regular breaks, and implementing interventions to mitigate stress and anxiety. Overall, these findings have important implications for policymakers, employers, and healthcare providers, and could help to improve the working conditions and mental health outcomes of traffic wardens.

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